4.9 HYDROLOGY/WATER QUALITY

This section addresses existing hydrology and water quality in Carlsbad, outlines applicable regulatory programs designed to manage water quality within the city, and discusses the potential impacts implementation of the DMP Update project components could have on local water quality and hydrology.

4.9.1 Existing Conditions

4.9.1.1 Regional Climatic Conditions and Precipitation

Climatic conditions in the Carlsbad area are consistent with the semiarid climate and temperature conditions predominant in San Diego County. Average annual temperature is 59.2 °F; average July/August high temperature is 72.9°F; and average January low temperature is 42.6°F. The predominant rainfall season is from October through March. Mean annual precipitation within Carlsbad is approximately 9 to 14 inches annually, with little variation over the area in terms of short-term rainfall intensity, duration, and frequency.

4.9.1.2 General Surface Hydrology

Carlsbad is located within the CHU No. 904.00. The CHU encompasses approximately 210 square miles and includes portions of eight jurisdictional areas: Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, Vista, and the County of San Diego. There are six individual watersheds or Hydrologic Areas within the Carlsbad Watershed: Loma Alta, Buena Vista Creek, Agua Hedionda, Encinas, San Marcos Creek, and Escondido Creek. Carlsbad's jurisdiction extends over portions of four of the watersheds: Buena Vista Creek, Agua Hedionda, Encinas, and San Marcos Creek. Four major coastal lagoons exist within the CHU: Buena Vista, Agua Hedionda, Batiquitos, and San Elijo. Agua Hedionda and Batiquitos lagoons occur entirely with the City's jurisdictional boundary, as well as portions of Buena Vista Lagoon.

Carlsbad is divided into four major watersheds: the Buena Vista Creek Watershed, the Agua Hedionda Creek Watershed, the Encinas Creek Watershed, and the Batiquitos Lagoon Watershed. Three of the listed watersheds terminate in coastal lagoons that support a variety of flora and fauna. The Encinas Creek Watershed is the only one among the four listed watersheds that discharges directly to the Pacific Ocean. Watershed boundaries correspond roughly to the project drainage basins (Basins A, B, C, and D), as discussed in Chapter 2.0 (Environmental

Setting). Figure 1-2 in Chapter 1.0 (Introduction) provides a map with the city limits, basin boundaries, and the main waters and blue-line streams for each basin.

4.9.1.3 Regulatory Authority

There are various regulatory agencies responsible for overseeing water quality, flooding, and hydrology issues within the State of California. Approval of projects with the potential to impact water quality, flood protection, or hydrology requires consultation with several agencies, as well as consistency with the rules and regulations of each agency.

Clean Water Act

The CWA is the primary federal statute governing the protection of water quality and was established to provide a comprehensive program to protect the nation's surface waters. The CWA consists of the Federal Water Pollution Prevention and Control Act, passed in 1948 and subsequent amendments of 1972 and 1987. The Water Pollution Prevention and Control Act required the USEPA to establish nationwide effluent standards on an industry-by-industry basis. The 1972 Amendment established the NPDES. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the U.S. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based on bio-monitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards. As a result of the reauthorization of the CWA in 1987, Sections 402(p) through 405 were added. One of the results of the new sections was the creation of the NPDES permit program, which is discussed later in this section. Also, as discussed in Section 4.10 (Biological Resources), the Section 404 program regulating discharges into waters of the U.S. was established by the CWA.

Porter-Cologne Act

The Porter-Cologne Water Quality Control Act (California Water Code Section 13000 et seq.) is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, the responsibilities for protecting water quality in California belong to the State Water Resources Control Board (SWRCB) and the nine subsidiary RWQCBs. The SWRCB and the subsidiary RWQCBs must adopt water quality policies, plans, and objectives to protect the State's waters for use and enjoyment by the people of California. Basin Plans are the regional water quality control plans required by both the CWA and the Porter-Cologne Act in which

beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB and nine RWQCBs are responsible for ensuring implementation and compliance with the provisions of the federal CWA and California's Porter-Cologne Water Quality Control Act. Along with the SWRCB and RWQCBs, water quality protection is the responsibility of numerous water supply and wastewater management agencies, as well as city and county governments, and requires the coordinated efforts of these various entities.

Carlsbad is situated within the jurisdiction of the San Diego RWQCB (Region 9). The San Diego RWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to water at locations within its jurisdiction. Water quality objectives for waterways in Carlsbad are specified in the Water Quality Control Plan for the San Diego Basin (Basin Plan), as prepared by the San Diego RWQCB. The most recent version of the Basin Plan is dated 1994, which was prepared in compliance with the provisions of the federal CWA and the State Porter-Cologne Water Quality Control Act.

National Pollutant Discharge Elimination System

The 1972 amendment to the CWA established the NPDES permit program. The NPDES permit program outlined in the CWA contains effluent limitation guidelines, water quality requirements, and permit program requirements for discharges to waters of the U.S. The USEPA has overall responsibility for the NPDES program, but administration of the program in California has been delegated to the SWRCB and the nine RWQCBs.

The 1987 amendments to the CWA established a framework for regulating discharges under the NPDES program and, in 1990, the USEPA promulgated regulations for permitting storm water discharges from industrial sites, including construction sites that disturb 5 acres or more, and from municipal separate storm sewer systems (MS4s) serving a population of 100,000 people or more. The November 16, 1990, regulations, known as the Phase I regulations (Title 55 FR 47990), rely on NPDES permit coverage to address storm water runoff from (1) operators of medium[4] and large[5] MS4s, (2) construction activity disturbing 5 acres of land or greater, and (3) 10 categories of industrial activity.

[4] An incorporated place or county with a population of 100,000 to 249,999.

On December 8, 1999, the USEPA promulgated regulations known as Phase II. The regulations set forth in the Storm Water Phase II Final Rule (Title 64 FR 68722) require permits for discharges from operators of small[6] MS4s and from construction sites disturbing at least 1 acre of land. Phase II is intended to further reduce adverse impacts to water quality in receiving waters and aquatic habitats by instituting controls on the unregulated sources of storm water discharges that have the greatest likelihood of continued environmental degradation. The goal of the NPDES non-point source regulations is to improve the quality of storm water discharged to receiving waters to the "maximum extent practicable" through the use of BMPs. The focus of the Phase II program is the implementation of the following six minimum control measures: public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction site runoff control, postconstruction runoff control, and pollution prevention and good housekeeping.

Under Phase II regulations in California, small MS4s are covered under the SWRCB Water Quality Order No. 2003-0005-DWQ, NPDES General Permit No. CAS000004 (Small MS4 Permit). Construction projects disturbing at least 1 acre of land are covered under the General Construction Permit: SWRCB Water Quality Order No. 99-08-DWQ, NPDES General Permit No. CAS000002 (SWRCB 2002). Compliance with the NPDES General Construction Permit (General Permit No. CAS000002) requires that any construction activity affecting 1 acre or more obtain a General Construction Activity Storm Water Permit. Permit applicants are required to submit a Notice of Intent (NOI) to the SWRCB and to prepare a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP identifies BMPs that must be implemented to reduce construction effects on receiving water quality. The BMPs identified are directed at implementing both sediment and erosion control measures and other measures to control potential chemical contaminants. Examples of construction BMPs identified in SWPPPs include using temporary mulching, seeding, or other stabilization measures to protect uncovered soils; storing materials and equipment to ensure that spills or leaks cannot enter the storm drain system or surface water; developing and implementing a spill prevention and cleanup plan; installing traps, filters, or other devices at drop inlets to prevent contaminants from entering storm drains; and using barriers, such as straw wattles or silt fencing, to minimize the amount of uncontrolled runoff that could enter drains or surface water.

---

[5] An incorporated place or country with a population of 250,000 or greater.

[6] An MS4 that is not permitted under the municipal Phase I regulations, and which is "owned or operated by the United States, a state, city, town, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes" (40 CFR Section 122.26(6)(16)).

Storm Water Municipal Permit

Carlsbad and other MS4s within the San Diego region were required to obtain coverage under NPDES. The NPDES program regulates storm water discharges from such municipalities under the municipal permit program. The County of San Diego, the 18 cities within San Diego County, the Port of San Diego, and more recently the San Diego Regional Airport Authority operate as copermittees under a single Municipal Permit, the San Diego Municipal Storm Water Permit (Order 2001-01), NPDES No. CAS0108758 (Municipal Permit), issued in 2001. The Municipal Permit expired in February 21, 2006; however, Tentative Order No. R9-2006-0011 for the Revised Municipal Permit has been issued. The Municipal Permit requires each copermittee to prepare guidance documents for storm water management, including the SUSMP, JURMP, and Watershed Urban Runoff Management Program (WURMP). The SUSMP is a guidance document that defines the local requirements that projects must comply with for storm water management and the requirements are incorporated into the local municipal code. The JURMP is the City's associated management document. The City's SUSMP and JURMP define the requirements for private and public projects to comply with storm water regulations. Carlsbad is also covered by the WURMP for the CHU, which includes seven other local jurisdictions. The WURMP defines the watershed level goals and the proposed strategy for managing water quality within the CHU.

4.9.1.4 Program Level

Hydrology

The following provides a description of the four watersheds and their relationship to the basin areas identified for the proposed DMP Update.

Buena Vista Creek Watershed (Basin A)

The Buena Vista Creek Watershed drains a 9-mile-long, 2-mile-wide area encompassing approximately 23 square miles (14,437 acres) (CWN 2006) and ultimately discharges out into Buena Vista Lagoon and into the Pacific Ocean. Buena Vista Creek traverses through the northwestern portion of Carlsbad and eventually discharges into man-made Buena Vista Lagoon. A 50-foot weir structure that is barely visible when the lagoon is at normal levels (BVLF 2006) controls water level by preventing water from flowing westward towards the Pacific Ocean, thus maintaining a minimum water level in the lagoon.

Approximately 3.5 square miles (2,270 acres) of this watershed is within Basin A. Basin A encompasses all areas in the city that drain into the Pacific Ocean via the Buena Vista Creek and the Buena Vista Lagoon. Buena Vista Creek originates in Vista. Basin A elevations range from sea level to 450 feet, with a few canyons located in the eastern portion of the basin. The western portion of the basin is predominantly flat coastal plain.

Agua Hedionda Creek Watershed (Basin B)

The Agua Hedionda Creek Watershed drains an area measuring approximately 29 square miles (18,837 acres) (CWN 2006) and ultimately discharges into Agua Hedionda Lagoon. Agua Hedionda Creek originates south of the San Marcos Mountains and merges with Buena Creek. After merging with Buena Creek, Agua Hedionda Creek runs approximately 6 miles before reaching Agua Hedionda Lagoon. In addition, the basin includes Lake Calavera and Squires Reservoir, which are located on the eastern edge of the basin. Calavera Creek, located approximately 1.4 miles upstream from Agua Hedionda Lagoon, originates from Lake Calavera and discharges into Agua Hedionda Creek. Water in the Squires Reservoir is treated for potable uses by city residents (CWN 2006).

Approximately 14.6 square miles (9,340 acres) of this watershed is within Basin B. Basin B elevations range from sea level to 582 feet with steep hillsides east of I-5. Basin B includes the area of the city that drains to Agua Hedionda Creek and Agua Hedionda Lagoon. Intermittent streams are located in low areas that feed the perennial Agua Hedionda Creek.

Encinas Creek Watershed (Basin C)

The Encinas Creek Watershed covers an area of approximately 5 square miles (3,434 acres) (CWN 2006) and runoff is discharged into Encinas Creek prior to reaching the Pacific Ocean. Encina Creek is located at the center of the watershed and serves as the main collector for storm water runoff. Encinas Creek originates approximately 3,000 feet east of El Camino Real in a small drainage behind an industrial park and flows west to the Pacific Ocean parallel to Palomar Airport Road. Encinas Creek does not end in a lagoon but flows directly into the Pacific Ocean after crossing I-5 and Carlsbad Boulevard (CWN 2006).

Approximately 4 square miles (2,580 acres) of this watershed is within Basin C. Topographically, Basin C has more gradual elevation change than the other basins, starting from sea level to a peak elevation of 410 feet. This basin encompasses the area of Carlsbad that drains into Encinas Creek.

Batiquitos Lagoon Watershed (Basin D)

The Batiquitos Lagoon Watershed encompasses 56 square miles (35,840 acres) (CWN 2006) and includes two major drainage conveyances, San Marcos Creek and Encinitas Creek, which ultimately drain into Batiquitos Lagoon. San Marcos Creek originates in the coastal mountain range northeast of San Marcos, while Encinitas Creek originates in the mountains southwest of San Marcos. The capacity of the lagoon allows it to provide considerable storage of storm water before discharging to the Pacific Ocean.

Approximately 17 square miles (10,907 acres) of this watershed is categorized as Basin D within Carlsbad. Basin D elevations range from sea level to 944 feet with numerous steep ravines located in the eastern portion of the basin forming various natural drainage patterns that produce intermittent streams. Basin D includes the portion of the city that drains to Batiquitos Lagoon and its tributaries.

Drainage

Surface water in Carlsbad drains through one of the four watersheds identified above. In addition to natural watercourses, drainage in the region has been altered by development and associated storm water infrastructure. Regional drainage currently consists of a combination of soft-bottomed natural watercourses and engineered infrastructure projects. The DMP Update presents existing and proposed projects to improve storm water drainage within Carlsbad.

Soils

The Soil Survey of San Diego County provides a standard classification of hydrologic soil groups, which establishes the expected potential of each soil type for generating runoff across the soil surfaces. The hydrologic soil group classifications are from A to D, with D representing soils that would generate greater runoff. As described below, soil types vary within each basin. For a discussion of the general soil associations, refer to Section 4.8 (Geology/Soils).

Basin A: Multiple hydrologic soil groups are present in Basin A. The eastern portion of the basin is underlain by a combination of Groups C and D, while the western portion of the basin contains a combination of Groups A and C.

Basin B: Group A soils are mainly present in the western coastal plain of this basin, while Group B soils are found in the eastern portion of the basin where Agua Hedionda Creek flows into Carlsbad from Vista. Group C and Group D soils are found in the eastern portion of the watershed.

Basin C: Existing soil types within this basin include Groups A and D. Group A soils are located in the coastal plain, while Group D soils can be found predominately east of I-5. A small sliver of Group B soils is located along Encinas Creek.

Basin D: Soil types within Basin D are mainly Group A in the western portion of the basin and in the streambeds of the creeks/ephemeral tributaries. Some drainage areas contain Group C soils, while the eastern slopes are primarily made up of Group D soils.

100-Year Floodplain

The Federal Emergency Management Agency (FEMA) prepares Flood Insurance Rate Maps (FIRMs) that indicate potential flood areas, based upon a 100-year storm and a 500-year event. A 100-year storm is a storm that statistically would occur once in a 100-year period. This is the standard used to determine areas of flooding for the purposes of flood insurance programs managed by FEMA, and it has become the standard for the evaluation of potential flooding impacts. Tables 4.9-1 and 4.9-2 summarize the program level PLDA and non-PLDA components proposed in the DMP Update that would be located within the 100-year floodplain, 500-year floodplain, and/or are within or adjacent to drainage channels. Staging areas are not anticipated to be located within the 100-year floodplain.

Water Quality

Water Quality Standards

The CHU is classified as having numerous beneficial uses, including municipal water supply; agriculture; industrial; contact and noncontact recreation; warm freshwater habitat; wildlife habitat; and rare, threatened, or endangered species. Section 303(d) of the federal CWA requires states to identify waterbodies that do not meet water quality standards and are not supporting their beneficial uses. There are two waterbodies and two watercourses with 303(d) listings in the CHU. These are summarized below.

Table 4.9-1
Floodplains and Drainage Channels within or adjacent to Proposed Program Level DMP Update PLDA Project Components

Project Component ID	Project Name	100-year Floodplain	500-year Floodplain	Drainage Channel
Basin A				
AAA	Jefferson Street Drainage Project			
AAAA	Madison Street Drainage Project			
AC	Highland Drive Drainage Project	X		X
AFA	Hidden Valley Drainage Restoration and Enhancement Project	X	X	X
AFB	North Calavera Hills Drainage Restoration and Enhancement Project			X
Basin B				
BB-1	Washington Street Drainage Improvements, Phase I			
BB-2	Washington Street Drainage Improvements, Phase II			
BCA	Park Drive/ Tamarack Avenue Drainage Project			
BCB	Magnolia Avenue Drainage Project			
BCC	Chestnut Avenue Drainage Project			
BF1	Kelly Drive Water Quality Basin Project			X
BFA	Country Store Storm Drain Project			
BFB-L	El Camino Real Drainage Project, Phase II			
BFB-U	El Camino Real Drainage Project, Phase I			
BJ	Rancho Carlsbad Sedimentation Basin Project	X		X
BJB	College Boulevard Sedimentation Basin Structural Improvements Project	X		X
BL-L	College Boulevard Drainage Project Phase V-Downstream Portion			X
BL-U	College Boulevard Drainage Project Phase IV-Upstream Portion	X		X
BM	Cantarini Box Culvert Project			
BNB	Calavera Creek Flood Control Improvement Phase II			
BP	Melrose Flood Retention Facility			X
BQ	Sunny Creek Road Restoration and Enhancement Project			X
Basin C				
C1	Carlsbad Boulevard South Drainage Improvements			X
C2	Paseo Del Norte Drainage Improvements			
CA	Avenida Encinas Drainage Improvements			
Basin D				
DBA	Poinsettia Village Drainage Improvements			
DBB	Avenida Encinas Drainage Project			
DFA	Batiquitos Lagoon Retention/ Detention Basin Project			
DH	Altiva Place Restoration and Enhancement Project			X
DQB	La Costa Town Center Drainage Improvements Project			
DZ	Poinsettia Lane Bridge Project			

Table 4.9-2
Floodplains and Drainage Channels within or adjacent to Proposed Program Level DMP Update Non-PLDA/CIP Project Components

Project Component ID	Project Name	100-year Floodplain	500-year Floodplain	Drainage Channel
Basin A				
Non-PLDA Project Components				
No specific non-PLDA components have been identified in Basin A at this time.				
CIP Project Components				
A-CIP-1	Miscellaneous Road Subdrains (Project Number 3681)			
A-CIP-2	Cynthia Lane Storm Drain Project; Cynthia Lane near I-5			
A-CIP-3	Carlsbad Boulevard Storm Drain Replacement Project; between the SDNR track and Carlsbad Boulevard			
A-CIP-4	Ridgecrest Drainage Improvements Project; Ridgecrest Drive			
Basin B				
Non-PLDA Project Components				
BAA	Cannon Road Drainage Improvements			X
BE	South of Van Allan Way on south side of Agua Hedionda Creek	X		X
BEA	Begins northeast of Faraday Avenue and extends southwest to the south side of Agua Hedionda Creek	X		X
BL-L	Bridge over Agua Hedionda Creek at College Boulevard			
CIP Project Components				
B-CIP-1 and B-CIP-2	Miscellaneous Road Subdrains (Project Number 3681)			
B-CIP-3	Highland Drive Drainage Improvements Project; Highland Drive between Pine Avenue and Basswood Avenue			
B-CIP-4	Kelly Drive Drainage Improvements; Kelly Drive east of Hillside Drive			
Basin C				
Non-PLDA Project Components				
C	Encinas Creek Restoration and Enhancement Project			X
CIP Project Components				
No specific CIP projects have been identified in Basin C at this time.				
Basin D				
Non-PLDA Project Components				
DFA	Northwest of the intersection of La Costa Avenue and El Camino Real			
DM	Between Poinsettia Lane and Alga Road, on the west side of Almaden Lane	X		X
CIP Project Components				
D-CIP-1 through D-CIP-6	Miscellaneous Road Subdrains (Project Number 3681)			

Table 4.9-2. Floodplains and Drainage Channels within or adjacent to Proposed Program Level DMP Update Non-PLDA/CIP Project Components (Continued)

Project Component ID	Project Name	100-year Floodplain	500-year Floodplain	Drainage Channel
D-CIP-7	La Costa Avenue Storm Drain Replacement Project; La Costa Avenue between El Camino Real and Viejo Castilla Way	X		
D-CIP-8	Gabbiano Lane Storm Drain Modification; south of Gabbiano Lane near Batiquitos Lagoon			
D-CIP-9	Calle Gavanzo Subsurface Drainage Improvements; west side of Calle Gavanzo			
D-CIP-10	Romeria Drainage Improvements Project; Romeria Street			

- Agua Hedionda Lagoon is listed as limited for sedimentation/siltation and bacteria indicators.
- Buena Vista Lagoon is listed as limited for nutrients, sedimentation/siltation, and bacteria indicators.
- Agua Hedionda Creek is listed as limited for total dissolved solids.

The Pacific Ocean coastal shoreline within Buena Vista Creek Hydrologic Area is listed for bacteria indicators.

Urban Runoff Quality

Constituents found in urban runoff vary during a storm event, from event to event within a given area, and from area to area within a given watershed. Variances can be the result of differences in rainfall intensity and occurrence, geographic features, and the land use of the area, as well as vehicle traffic and the percentage of impervious surface. Furthermore, sediment runoff from construction sites without adequate erosion control measures can contribute sediments, pesticides, fertilizers, and other pollutants to receiving waters.

In the Carlsbad area, the natural weather pattern consists of a dry period from May to September, and a wet season from October to March. During the seasonal dry period, pollutants contributed by vehicle exhaust, vehicle and tire wear, spills, and atmospheric fallout accumulate within the watershed. Precipitation during the early portion of the wet season displaces these pollutants into surface runoff, which can result in elevated pollutant concentrations in initial wet weather runoff. Concentrations of pollutants present in dry weather runoff are typically lower than

concentrations present in wet weather runoff. Some sources of constituent pollutants in dry weather runoff include commercial and domestic irrigation, general wash-off, groundwater infiltration, and illegal discharges.

4.9.1.5 Project Level

There are two watercourses within the Agua Hedionda project area (project components B and BN): Agua Hedionda Creek and Calavera Creek. Agua Hedionda Creek is listed as having the following beneficial uses: municipal water supply, agriculture, industrial, contact and noncontact recreation, warm freshwater habitat, and wildlife habitat. Calavera Creek is not listed with beneficial uses in the current Basin Plan.

Agua Hedionda Creek is a 303(d) listed water body and has been designated as impaired for total dissolved solids. In addition, Agua Hedionda Lagoon (the ultimate receiving water body) has been designated as limited for sedimentation/siltation and bacteria indicators.

4.9.2 Significance Criteria

Proposed DMP Update project components would have a potentially significant impact on hydrology and water quality if they would:

- violate federal, state, or local water quality standards or waste discharge requirements;
- alter the existing drainage pattern of flow of the area, including through the alteration of the course of a stream or river, in a manner that would result in adverse impacts from erosion, siltation, or flooding on- or off-site;
- create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- otherwise adversely impact water quality;
- place housing or other structures within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or FIRM or other flood delineation map, that would impede or redirect flows; or
- expose people or structures to a significant risk of loss, injury, or death involving flooding.

4.9.3 Impact Analysis

Impacts to water quality were evaluated qualitatively by assessing proposed long-term activities and maintenance requirements for the components proposed in the DMP Update. The proposed projects may result in a temporary degradation of storm water quality during construction and the operation and maintenance of the proposed infrastructure changes would result in alterations to surface runoff management during a storm event. However, implementation of the proposed DMP Update at the program and project levels would serve to indirectly improve storm water quality in the city boundaries. The proposed drainage improvements would reduce flooding potential, decrease erosion and sedimentation, and enhance storm water flows within the city. In addition, all proposed drainage facilities and infrastructure would comply with the City's Standard Design Criteria to ensure they are properly sized to handle 100-year flood conditions. Therefore, the proposed DMP Update improvements would indirectly result in positive effects on the long-term management of storm water flows in the region.

4.9.3.1 Program Level

Construction Activities

Land-disturbing construction activities associated with implementation of the proposed DMP Update, such as grading and excavation and the construction of infrastructure, could lead to temporary construction phase impacts. Construction activities involving soil disturbance, excavation, cutting/filling, stockpiling, and grading could potentially impact receiving water quality. During a storm event, the sediment load of surface runoff flowing over disturbed soils increases, resulting in additional erosion of the site surface. There is also the potential that construction materials such as asphalt, concrete, and equipment fluids could be exposed to rainfall, which would result in contaminated surface runoff and adverse impacts to receiving water quality.

Anticipated impacts also include the potential for localized alteration of drainage patterns. These alterations may result in temporarily exceeding the capacity of storm water facilities if substantial drainage is rerouted. Temporary ponding and/or flooding could also result from such activities, from temporary alterations of the drainage system (reducing its capacity of carrying runoff), or from the temporary creation of a sump condition due to grading. Alterations may temporarily result in erosion and siltation if flows are substantially increased or routed to facilities or channels without capacity to carry the flow.

As discussed above, construction of any project (greater than or equal to 1 acre) requires submission of an NOI to the SWRCB and preparation of a SWPPP to comply with the requirements of the NPDES General Construction Permit. BMPs identified in the SWPPP help reduce impacts related to construction activities and postconstruction activities on storm water quality. In addition, under the San Diego County Municipal Permit, compliance with the City's storm water management requirements includes preparation of a Water Quality Technical Report (WQTR), which would minimize any impact of proposed projects on storm water quality, regardless of project size.

The requirement for preparation of appropriate storm water management documents has been included in the design features of the project. Implementation of appropriate BMPs defined in these documents including, but not limited to, those summarized below, would minimize impacts to water quality by controlling runoff and by ensuring that the quality of storm water flows meets the applicable requirements. Consequently, any short-term impacts resulting from alterations of drainage and hydrology during construction would be less than significant.

Erosion would be controlled through use of the following types of BMPs, which would be incorporated into the appropriate project-specific SWPPP or WQTR, as required in Table 3-6. BMP designations are based on those used by the California Department of Transportation Storm Water Quality Handbooks, Construction Site BMPs Manual (Caltrans 2000) and the California Stormwater Quality Association Construction BMP Handbook (2004):

- Scheduling (SS-1): Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes.

- Preservation of Existing Vegetation (SS-2): Preservation of existing vegetation to the maximum extent practicable facilitates protection of surfaces from erosion and can also provide sediment control benefits. Sensitive areas should also be clearly identified and protected.

- Hydraulic Mulch (SS-3), Straw Mulch (SS-6), and Wood Mulching (SS-8): The use of various mulches is a temporary soil stabilization method that can be used on surfaces with little or no slope.

- Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (SS-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles.

- Stabilized Construction Entrance/Exit (TC-1): A graveled area or pad located at points where vehicles enter and leave a construction site can be built. This BMP provides a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust.

- Runoff Control Measures (SS-9, SS-10 and SC-10): These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and storm water conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Diversions can be either temporary or permanent in nature. Temporary diversions include excavation of a channel along with placement of the spoil in a dike on the downgradient side of the channel, and placement of gravel in a ridge below an excavated swale. Permanent diversions are used to divide a site into specific drainage areas, should be sized to capture and carry a specific magnitude of storm event, and should be constructed of more permanent materials. A water bar is a specific kind of runoff diversion that is constructed diagonally at intervals across a linear sloping surface such as a road or right-of-way that is subject to erosion. Water bars are meant to interrupt accumulation of erosive volumes of water through their periodic placement down the slope, and divert the resulting segments of flow into adjacent undisturbed areas for dissipation.

- Silt Fence (SC-1): A temporary sediment barrier consisting of fabric, designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows.

- Gravel Bag Berm (SC-6) and Sand/Gravel Bag Barrier (SC-8): A temporary sediment barrier consisting of gravel-filled fabric bags, designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows.

- Desilting Basin (SC-2) and Sediment Trap (SC-3): Construction of temporary detention structures to facilitate the removal of sediment from waters. The devices provide time for sediment particles to settle out of the water before runoff is discharged.

- Storm Drain Inlet Protection (SC-10): Inlet protection consists of devices that detain or filter sediment-laden runoff to facilitate the removal of sediment from waters prior to discharge.

Secondary concerns include potential pollutants from inappropriate material storage and handling procedures and non-storm water discharges. These would be addressed through the

following types of BMPs, which would be incorporated into the appropriate project-specific SWPPP or WQTR, as required in Table 3-6:

- Material Delivery and Storage (WM-1): Provide covered storage for materials, especially toxic or hazardous materials, to prevent exposure to storm water. Toxic or hazardous materials should also be stored and transferred on impervious surfaces that will provide secondary containment for spills. Vehicles and equipment used for material delivery and storage, as well as contractor vehicles, should be parked in designated areas.

- Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an overpack drum, are provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous.

- Solid Waste Management (WM-5): Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter.

- Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes.

- Concrete Waste Management (WM-8): Excess concrete should be disposed of in specific concrete washout facilities.

- Sanitary/Septic Waste Management (WM-9): Sanitary and septic waste facilities should be located away from drainage courses and traffic areas. The facilities should be maintained regularly.

- Street Sweeping and Vacuuming (SC-7): Perform regular street cleaning at entrance/exit points to the construction site and within the construction site as necessary.

- Vehicle and Equipment Cleaning (NS-8): Clean vehicles and equipment that regularly enter and leave the construction site.

- Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off-site whenever possible. If off-site fueling is not practical, establish a designated on-site fueling area with proper containment and spill cleanup materials.

- Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be protected from storm water runoff and runon.

4.9.3.2 Operation and Maintenance

Temporary construction-related impacts to water quality, such as non-storm water discharges, illicit connections to the storm drainage system, accidental spills, and other operational impacts associated with operation and maintenance activities, would be minimized through implementation of the spill contingency plan and construction measures identified in Table 3-6, including a SWPPP or WQTR, as appropriate. Operation and maintenance activities would occur in existing or proposed drainage facilities. Operation and maintenance of the City's drainage system with the proposed DMP Update upgrades would improve storm water flow in the region. Operation and maintenance activities would allow drainage facilities to continue to provide adequate flood protection, storm water quality control, and storm flow conveyance. Overall, potential impacts to hydrology/water quality from operation and maintenance activities would be less than significant.

4.9.3.3 Project Level

Implementation of the drainage improvements in Agua Hedionda and Calavera creeks (components B and BN) would modify the existing watercourses, through channel widening, and removal of accumulated sediment, to return the channels to conditions similar to the original design contours, thereby restoring capacity in the channels and reducing the potential for flooding of the adjacent Rancho Carlsbad residential community. No changes to land use are proposed as a part of the project. The minor alterations in the watercourses and ongoing maintenance would result in modifications to surface runoff management and potential construction and maintenance period impacts to water quality.

The proposed DMP Update project level components B and BN involve dredging and construction activities that could potentially degrade water quality in the creeks. To avoid and minimize impacts to water quality, project components B and BN would be required to incorporate BMPs into the project design, which would be part of the project's SWPPP, as

specified in Table 3-6. Construction BMPs would be specifically developed to control the effects of dredging and other construction-related project activities, including bridge modifications and equipment operation and maintenance, to regulate in-stream disturbances. In-stream water quality controls, as well as upland construction site BMPs, would be implemented in compliance with resource agency permit requirements to avoid or minimize potential water quality impacts. In addition to the project design features/methods and construction measures identified in Table 3-6, BMPs that would be implemented as part of the project SWPPP during dredging and construction activities could also include, but not be limited to:

- gravel-bag check dam structures to create stilling pools for capturing sediment and controlling turbidity downstream of the project limits;
- flocculant logs to promote the settling of suspended silt particles in stilling pools;
- creation of a diversion channel to protect active stream flow from water quality impacts associated with in-stream construction activities;
- desilting basins upstream of project limits to promote sediment settling and capture prior to flow coming in contact with the gravel-bag check dams downstream;
- access roadways along sides of channel bottoms to allow the dredging excavator and dump trucks to travel the length of the creek without disturbing water quality;
- stream crossings with a water quality bypass underneath the access route, such as a steel pipe covered with creekbed sand; and
- turbidity compliance monitoring, including collection of water samples within the active flow to measure turbidity onshore, measurement of creek velocity at the point of measurement, and recording of visual observations.

The proposed dredging and improvements to Agua Hedionda and Calavera creeks would improve flood control within the creeks and alleviate or partially alleviate residences from inundation during a 100-year flood event. A beneficial impact of the proposed project would be a reduced 100-year floodplain within the project area. This change to the 100-year floodplain would require modifications to existing FIRMs. Modifications to existing FIRMs would be a separate action under FEMA requiring a CLOMR and LOMR to remove property from a Special Flood Hazard Area.

4.9.4 Significance of Impacts

4.9.4.1 Program Level

Potential short-term impacts to storm water quality, including potential discharges to 303(d) listed waterbodies, would be considered less than significant during construction. Long-term postconstruction impacts would be beneficial to hydrology, drainage capacity, and water quality in Carlsbad overall.

4.9.4.2 Operation and Maintenance

Potential short-term impacts to storm water quality would be considered less than significant during construction. Overall, long-term postconstruction impacts would be beneficial to storm water conveyance and water quality throughout Carlsbad.

4.9.4.3 Project Level

Potential short-term impacts to storm water quality would be considered less than significant during construction. Long-term postconstruction impacts would be beneficial to hydrology, drainage capacity, and water quality in Basin B.

4.9.5 Mitigation Measures

4.9.5.1 Program Level

Potential hydrology/water quality impacts from implementation of proposed program level DMP Update components would be less than significant; therefore, no mitigation would be required.

4.9.5.2 Operation and Maintenance

Potential impacts from proposed operation and maintenance activities would be less than significant; therefore, no mitigation would be required.

4.9.5.3 Project Level

Potential hydrology/water quality impacts from project level DMP Update components would be less than significant; therefore, no mitigation would be required.

This page intentionally left blank.